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Coulson

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(54) **VISUAL IMAGES PROCESSED ON PORTIONS OF FOLDED SUBSTRATE**

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CPC H04N 1/00307; H04N 2201/0081; H04N 2201/0082; H04N 1/00347; H04N 2201/0096
USPC 358/474, 498, 505
See application file for complete search history.

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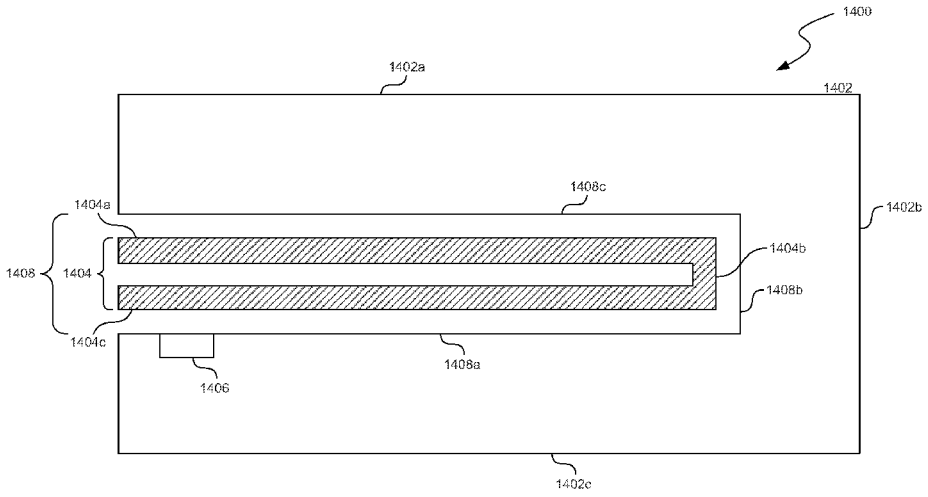
Primary Examiner — Eric A Rust
(74) *Attorney, Agent, or Firm* — Brundidge & Stanger, P.C.

(57) **ABSTRACT**

Technology is described for a handheld device with multimedia content recording and printing ("the described technology"). In various embodiments, the described technology can capture and record images, video, and sound, e.g., by using an image capture sensor and/or scanner. In various embodiments, the described technology can print various types of images, e.g., photographs, postcards, legal documents, and so forth.

23 Claims, 15 Drawing Sheets



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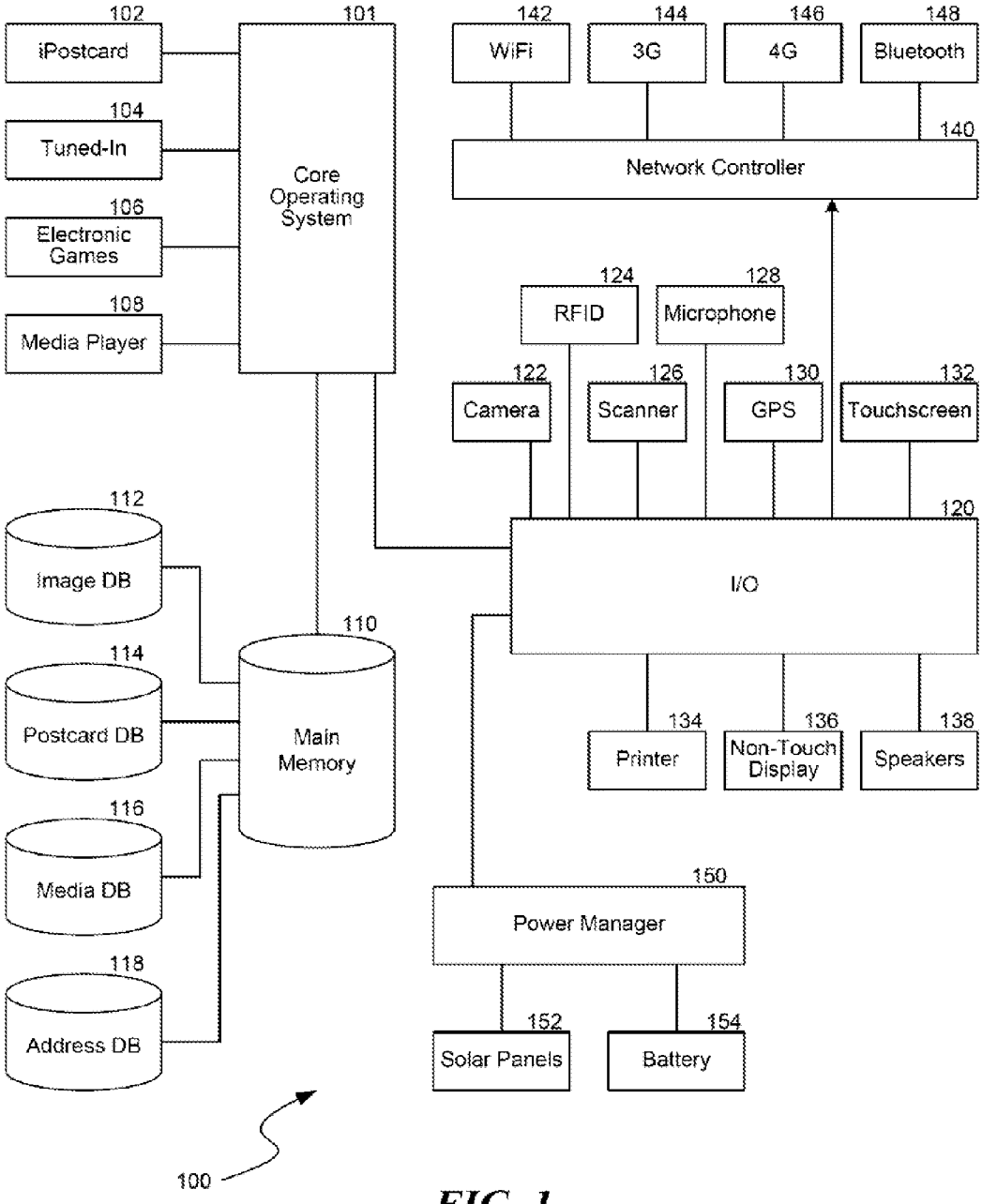
102
iPostcard
104
Tuned-In
106
Electronic Games
108
Media Player
101
Core Operating System
142
WiFi
144
3G
146
4G
148
Bluetooth
140
Network Controller
124
RFID
128
Microphone
122
Camera
126
Scanner
130
GPS
132
Touchscreen
120
I/O
112
Image DB
114
Postcard DB
116
Media DB
118
Address DB
110
Main Memory
134
Printer
136
Non-Touch Display
138
Speakers
150
Power Manager
152
Solar Panels
154
Battery
100

FIG. 1

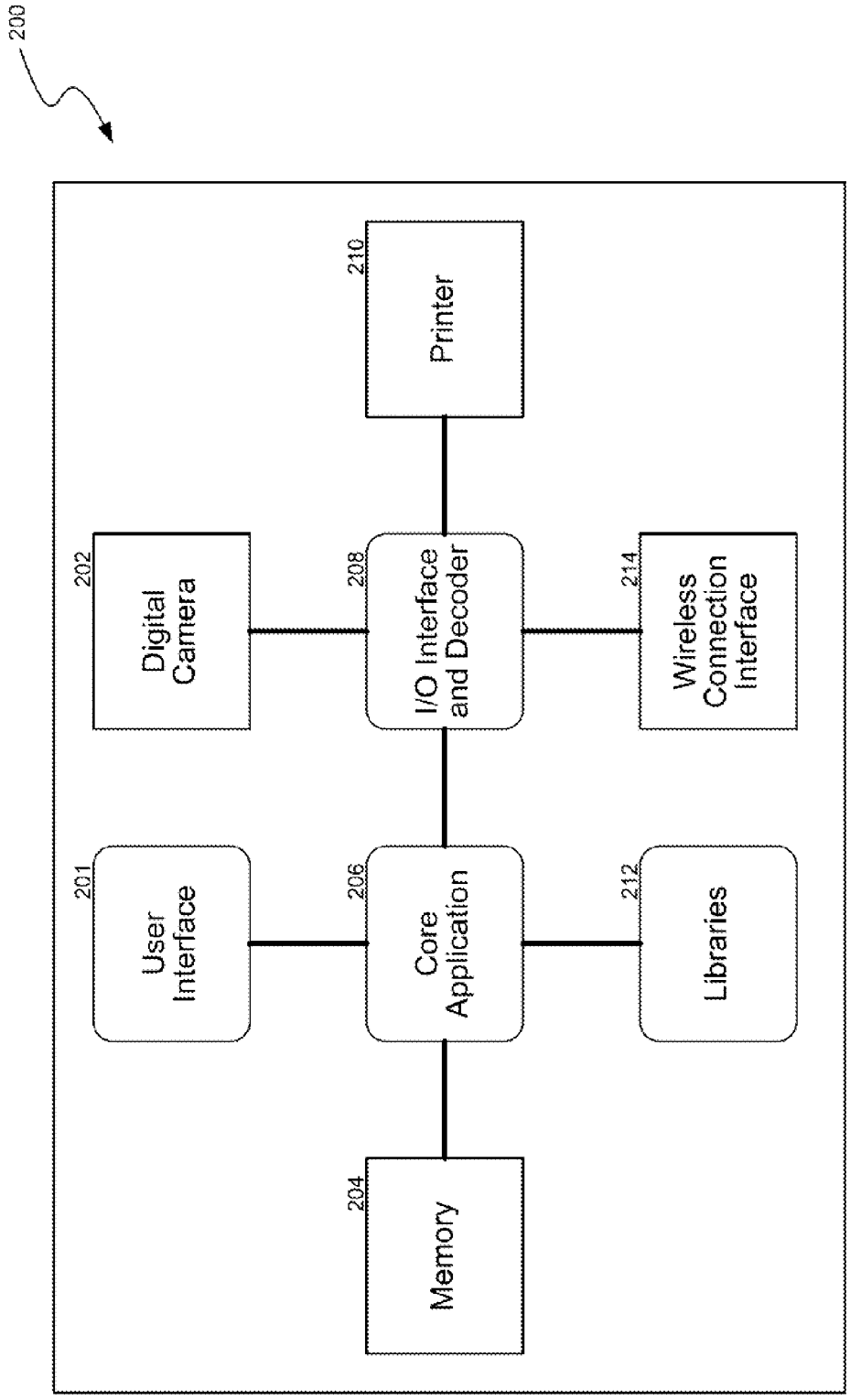
200
210
Printer
202
Digital Camera
208
I/O Interface and Decoder
214
Wireless Connection Interface
201
User Interface
206
Core Application
212
Libraries
204
Memory

FIG. 2

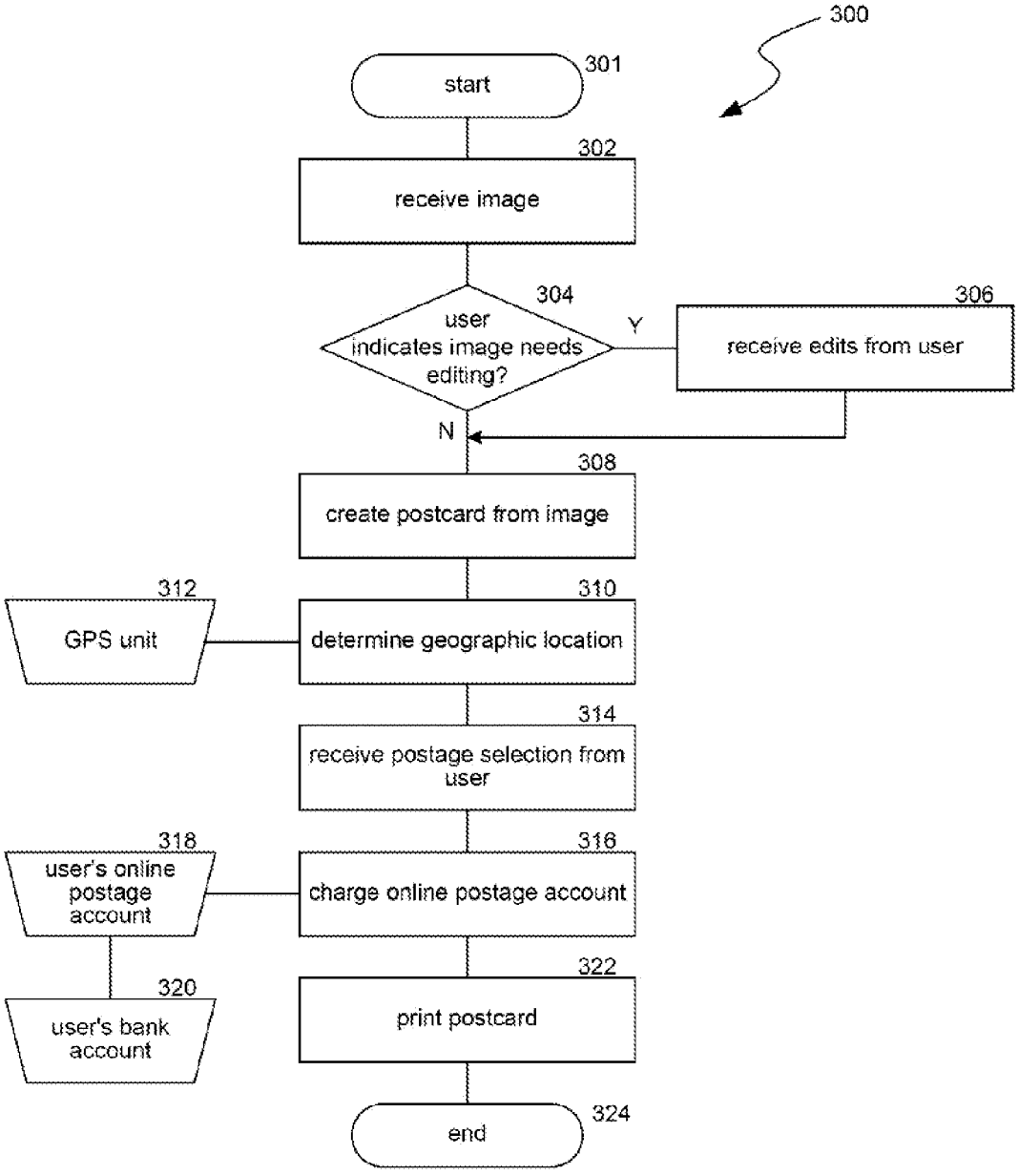
300
start
301
302
receive image
304
user indicates image needs editing?
Y
306
receive edits from user
N
308
create postcard from image
312
GPS unit
310
determine geographic location
314
receive postage selection from user
318
user's online postage account
316
charge online postage account
320
user's bank account
322
print postcard
end
324

FIG. 3

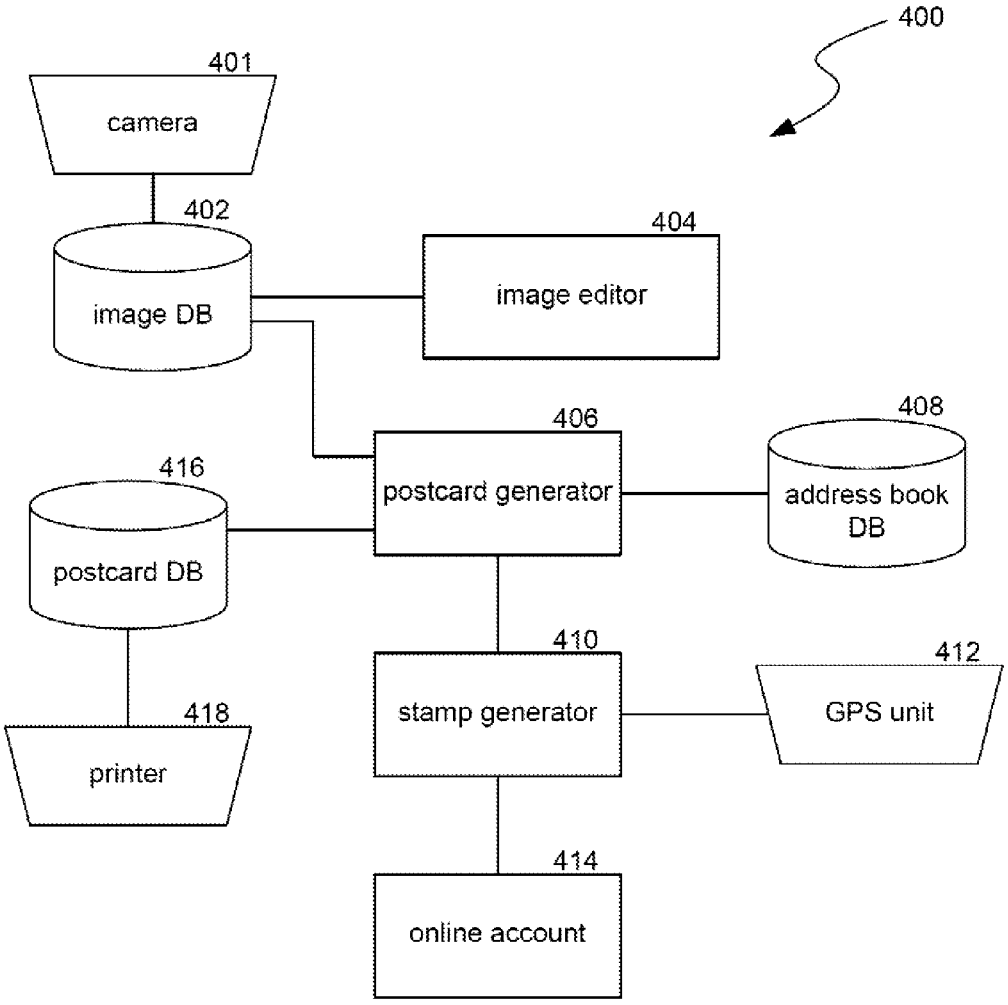
400
401
camera
402
image DB
404
image editor
406
postcard generator
408
address book DB
416
postcard DB
410
stamp generator
412
GPS unit
418
printer
414
online account

FIG. 4

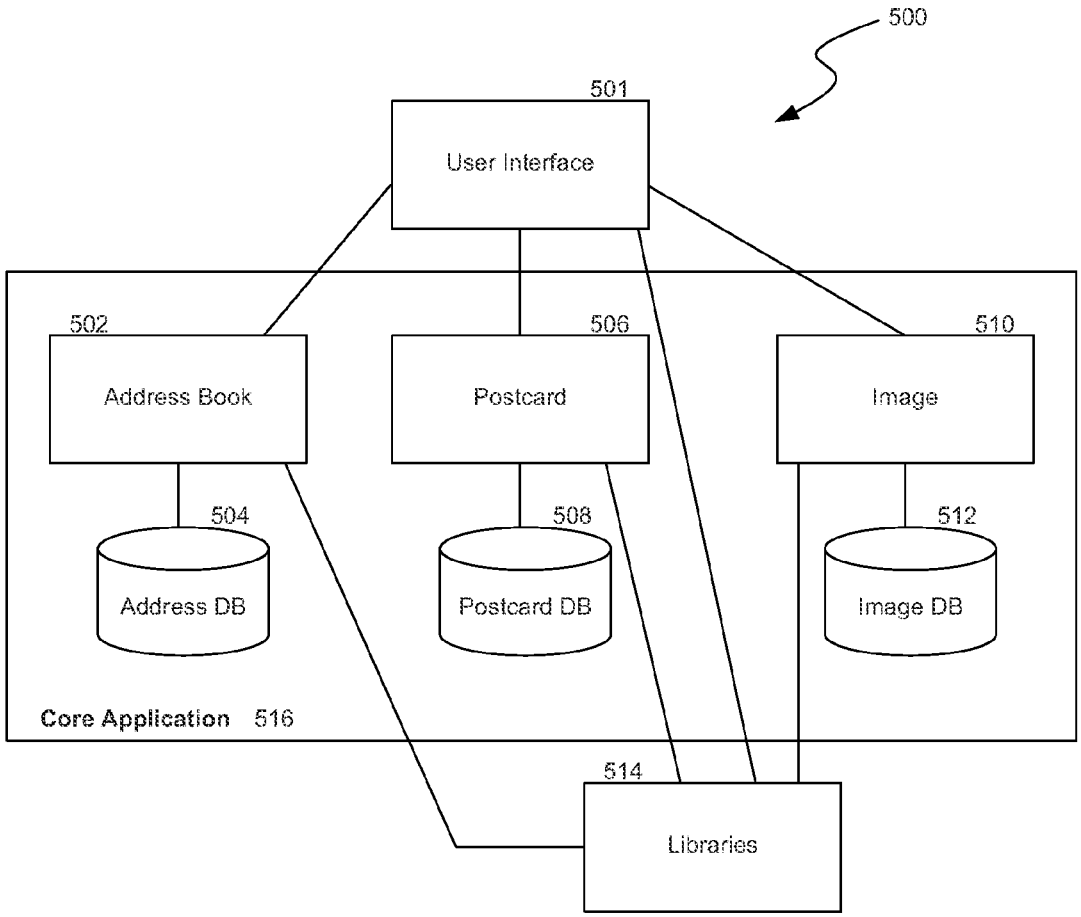
500
501
User Interface
502
Address Book
506
Postcard
510
Image
504
Address DB
508
Postcard DB
512
Image DB
Core Application 516
514
Libraries

FIG. 5

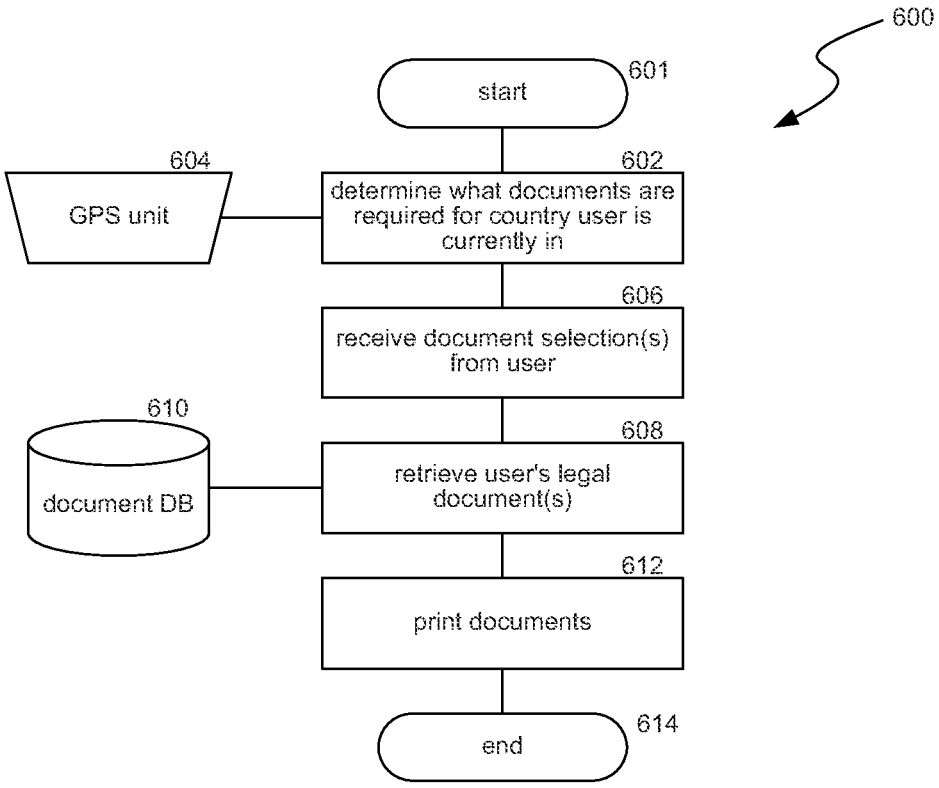
600
start
601
604
GPS unit
602
determine what documents are required for country user is currently in
606
receive document selection(s) from user
610
document DB
608
retrieve user's legal document(s)
612
print documents
end
614

FIG. 6

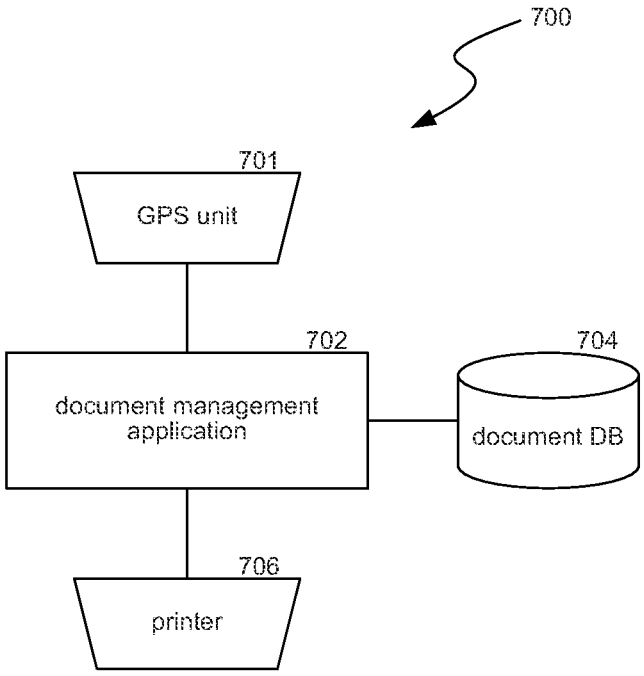
700
701
GPS unit
702
document management application
704
document DB
706
printer

FIG. 7

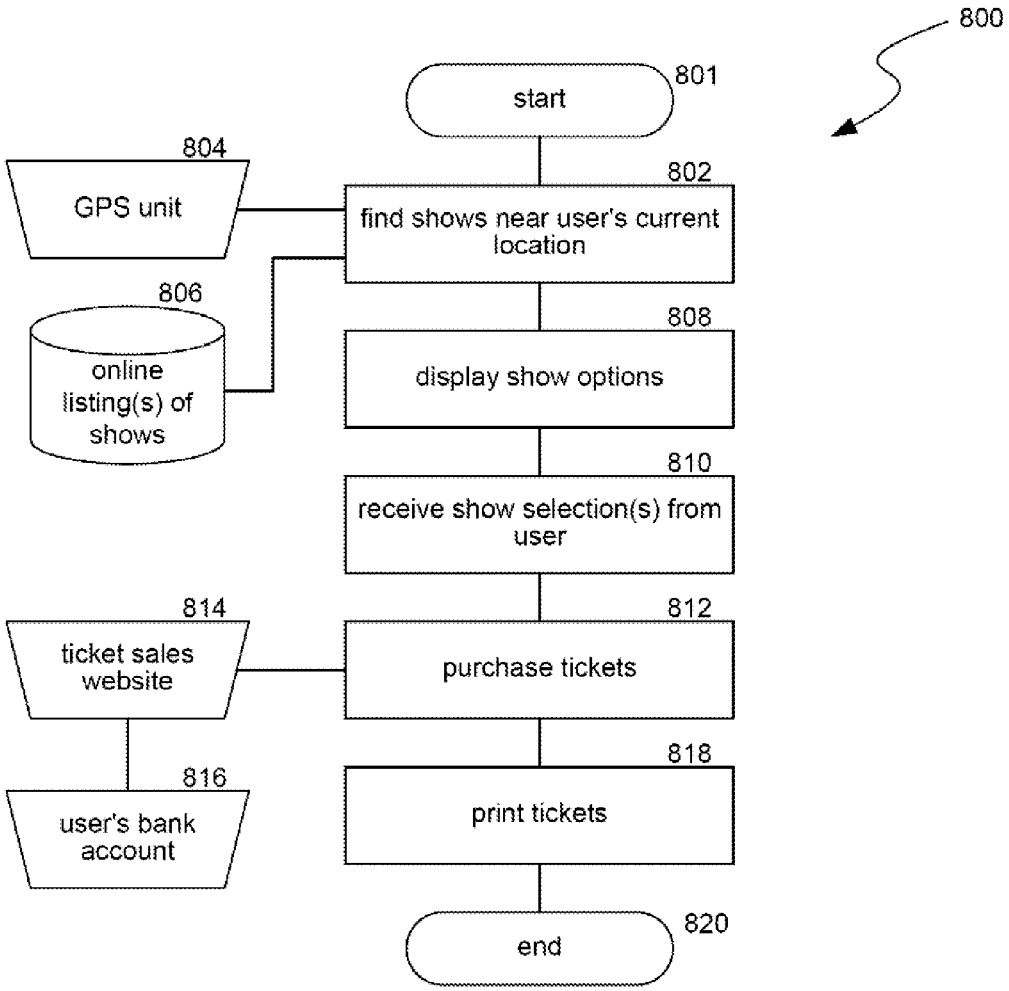
800
start
801
804
GPS unit
802
find shows near user's current location
806
online listing(s) of shows
808
display show options
810
receive show selection(s) from user
814
ticket sales website
812
purchase tickets
816
user's bank account
818
print tickets
end
820

FIG. 8

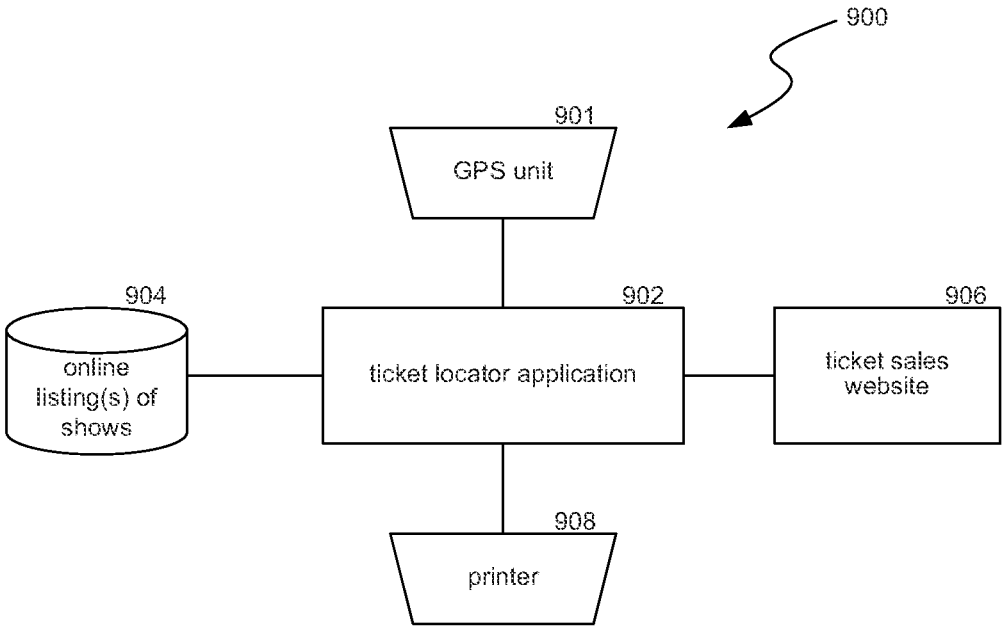
900
901
GPS unit
904
online listing(s) of shows
902
ticket locator application
906
ticket sales website
908
printer

FIG. 9

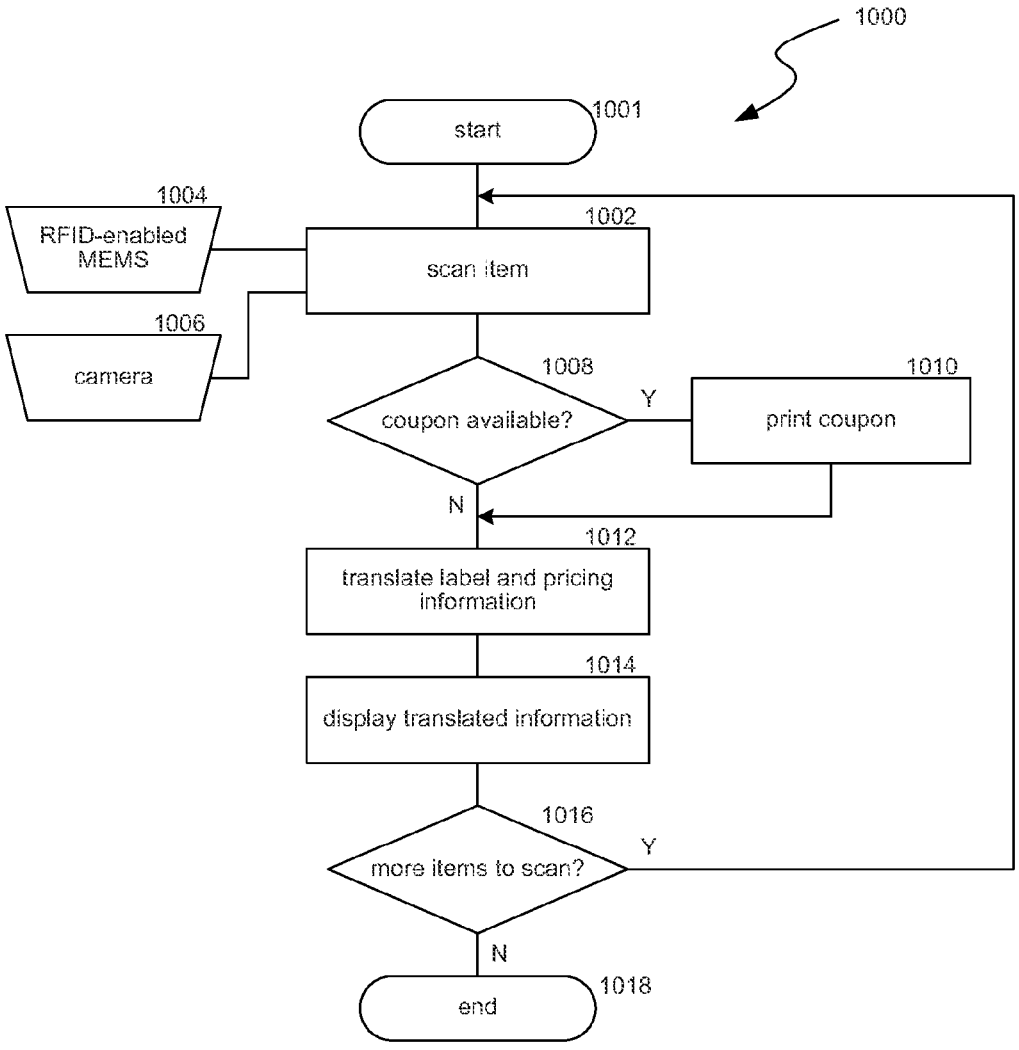
1000
start
1001
1004
RFID-enabled MEMS
1002
scan item
1006
camera
1008
coupon available?
Y
1010
print coupon
N
1012
translate label and pricing information
1014
display translated information
1016
more items to scan?
Y
N
end
1018

FIG. 10

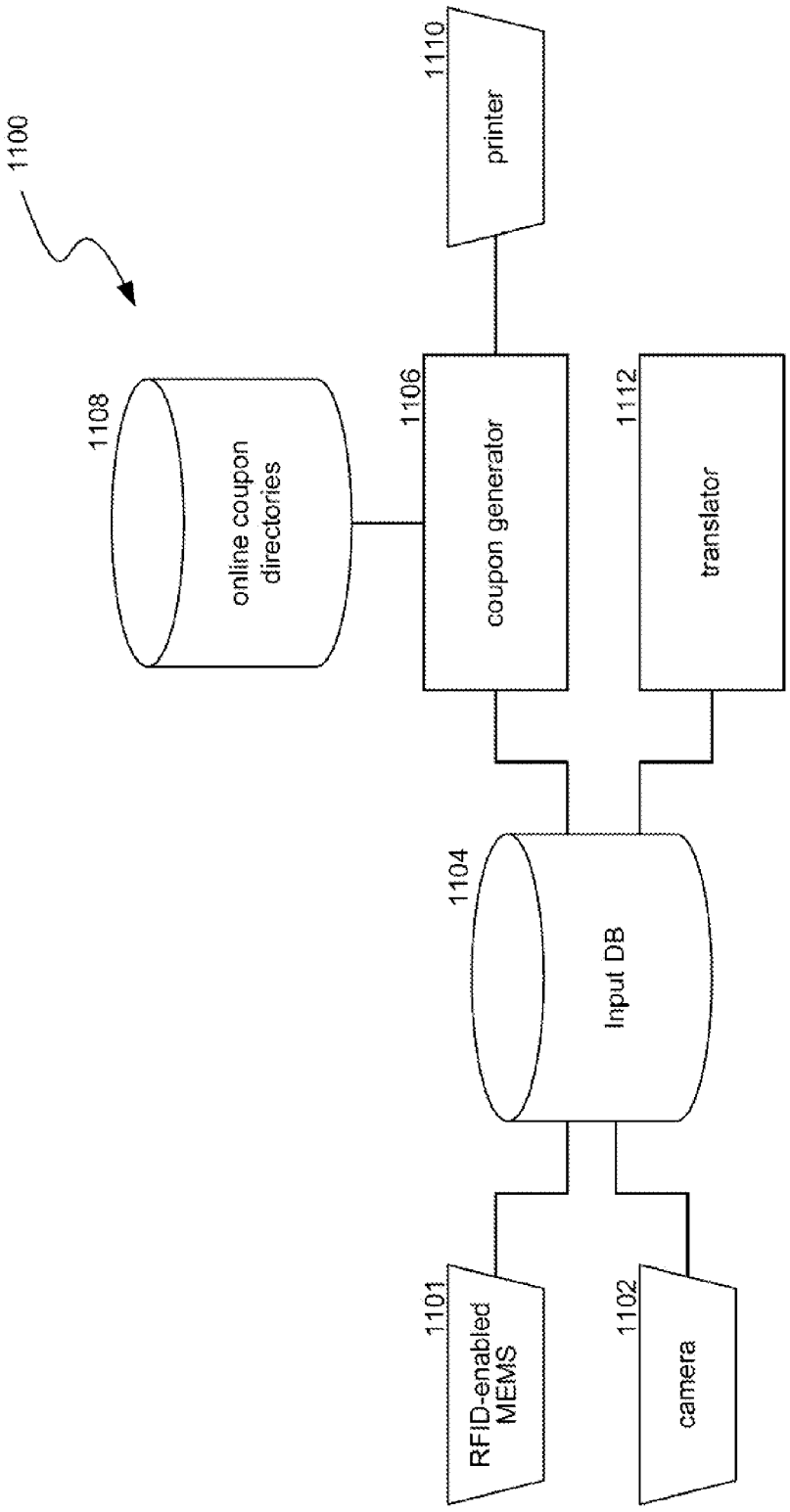
1100
1110
printer
1108
online coupon directories
1106
coupon generator
1112
translator
1104
Input DB
1101
RFID-enabled MEMS
1102
camera

FIG. 11

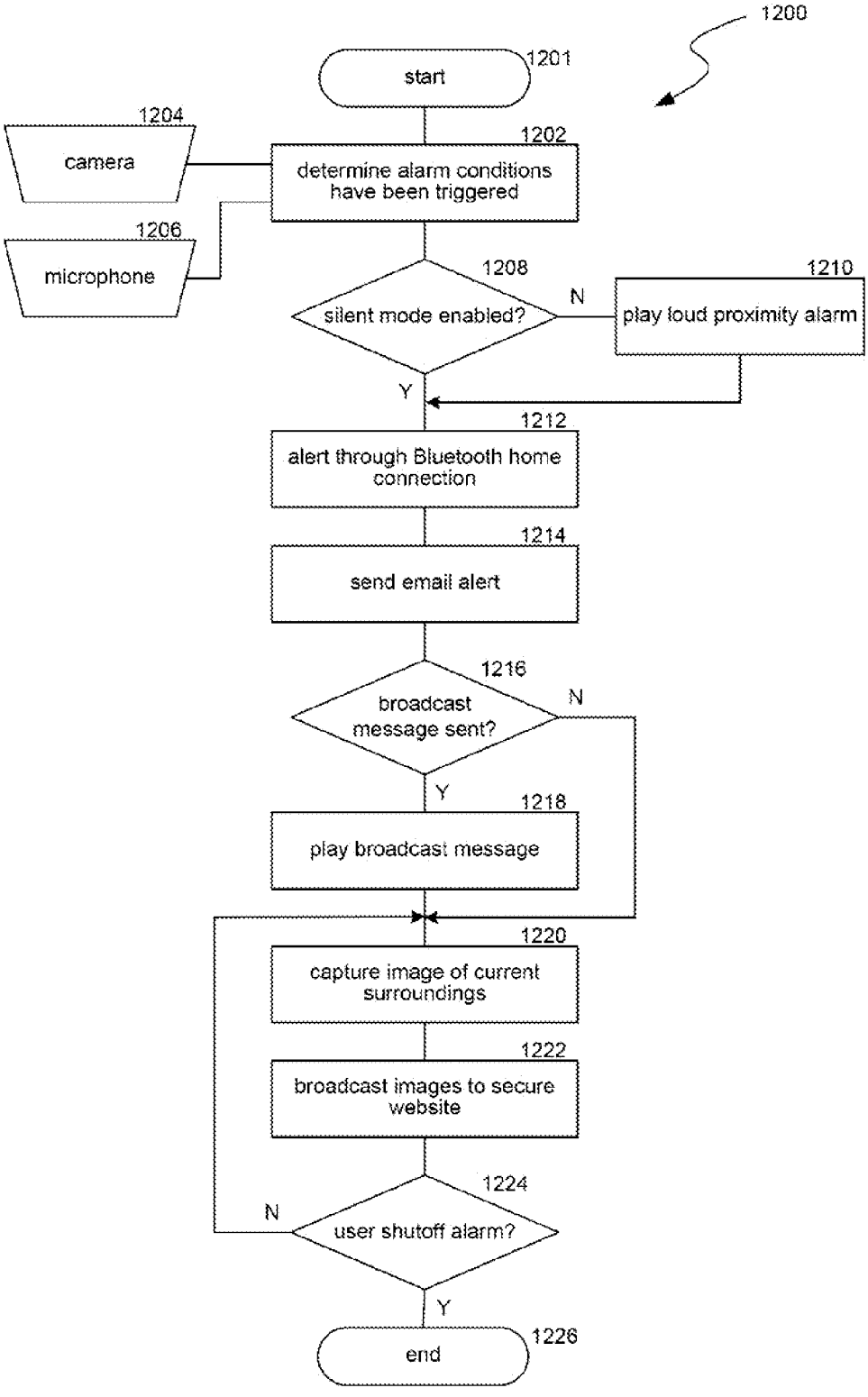
1200
start
1201
1204
camera
1202
determine alarm conditions have been triggered
1206
microphone
1208
silent mode enabled?
N
1210
play loud proximity alarm
Y
1212
alert through Bluetooth home connection
1214
send email alert
1216
broadcast message sent?
N
Y
1218
play broadcast message
1220
capture image of current surroundings
1222
broadcast images to secure website
1224
N
user shutoff alarm?
Y
end
1226

FIG. 12

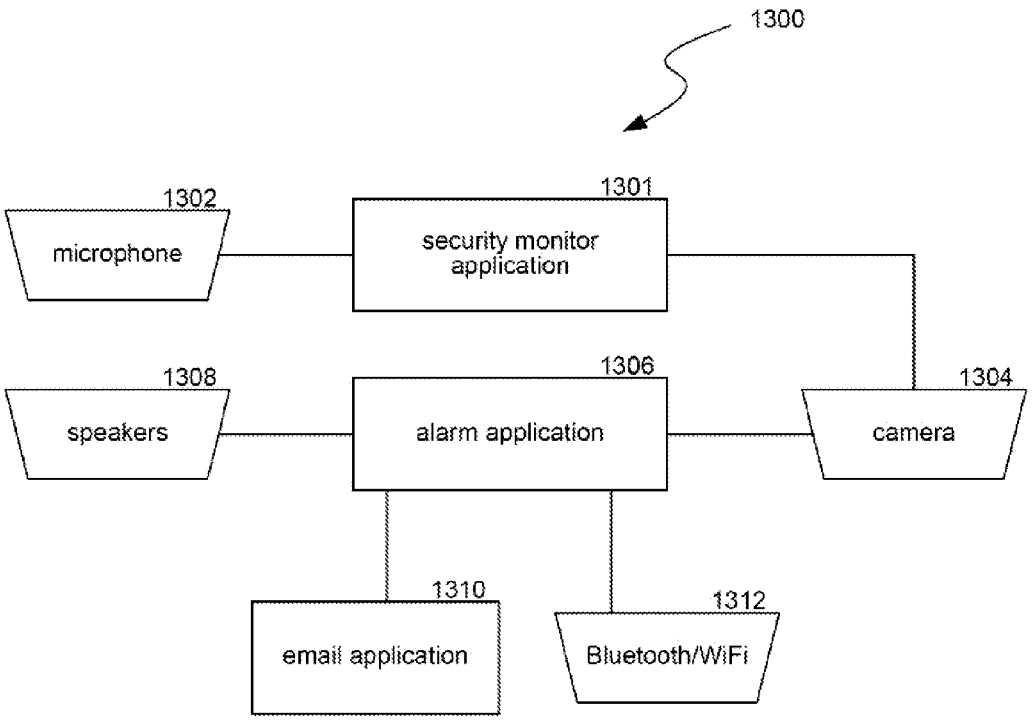
1300
1302
microphone
1301
security monitor application
1308
speakers
1306
alarm application
1304
camera
1310
email application
1312
Bluetooth/WiFi

FIG. 13

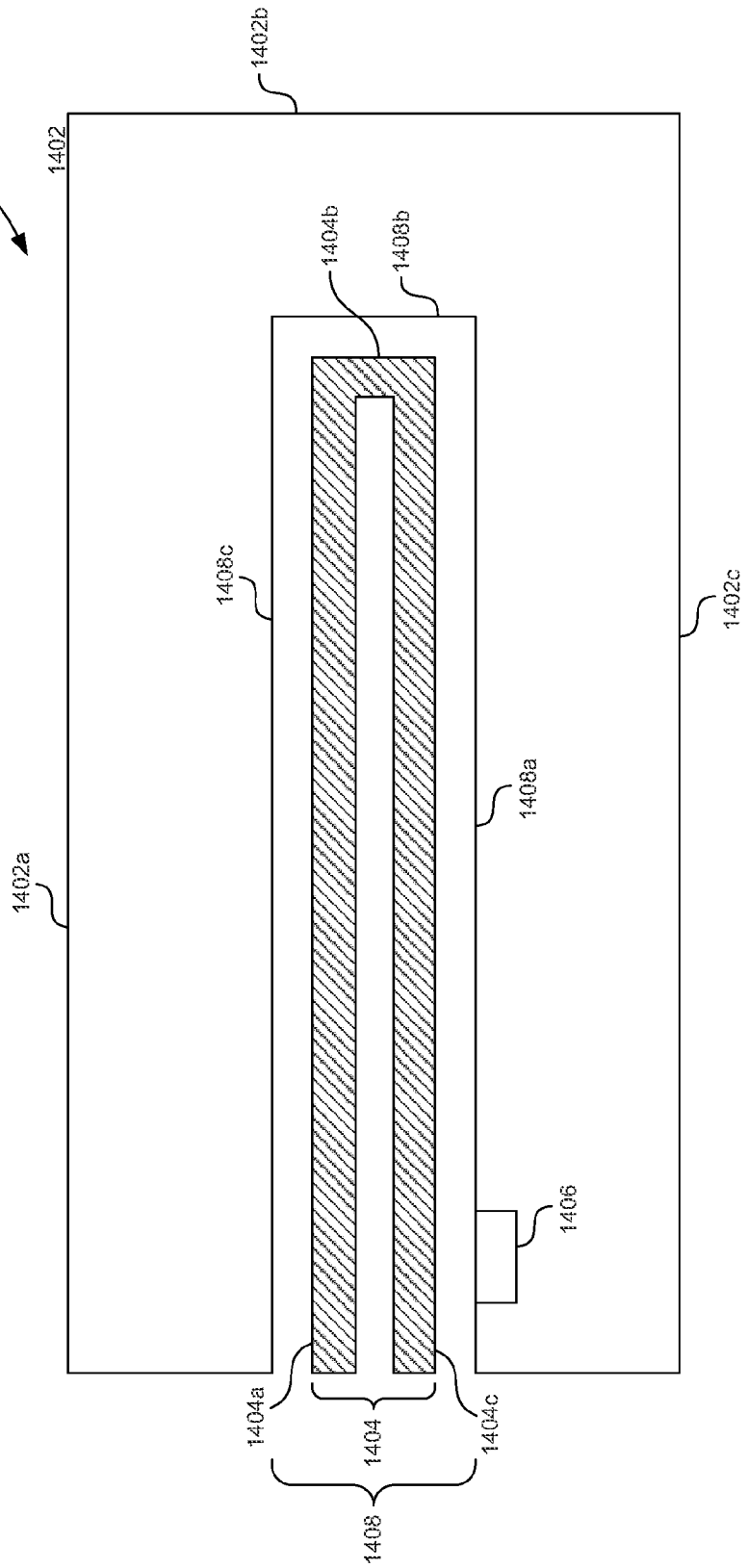
1400
1402
1402b
1404b
1408b
1408c
1402c
1408a
1402a
1406
1404a
1404
1404c
1408

FIG. 14

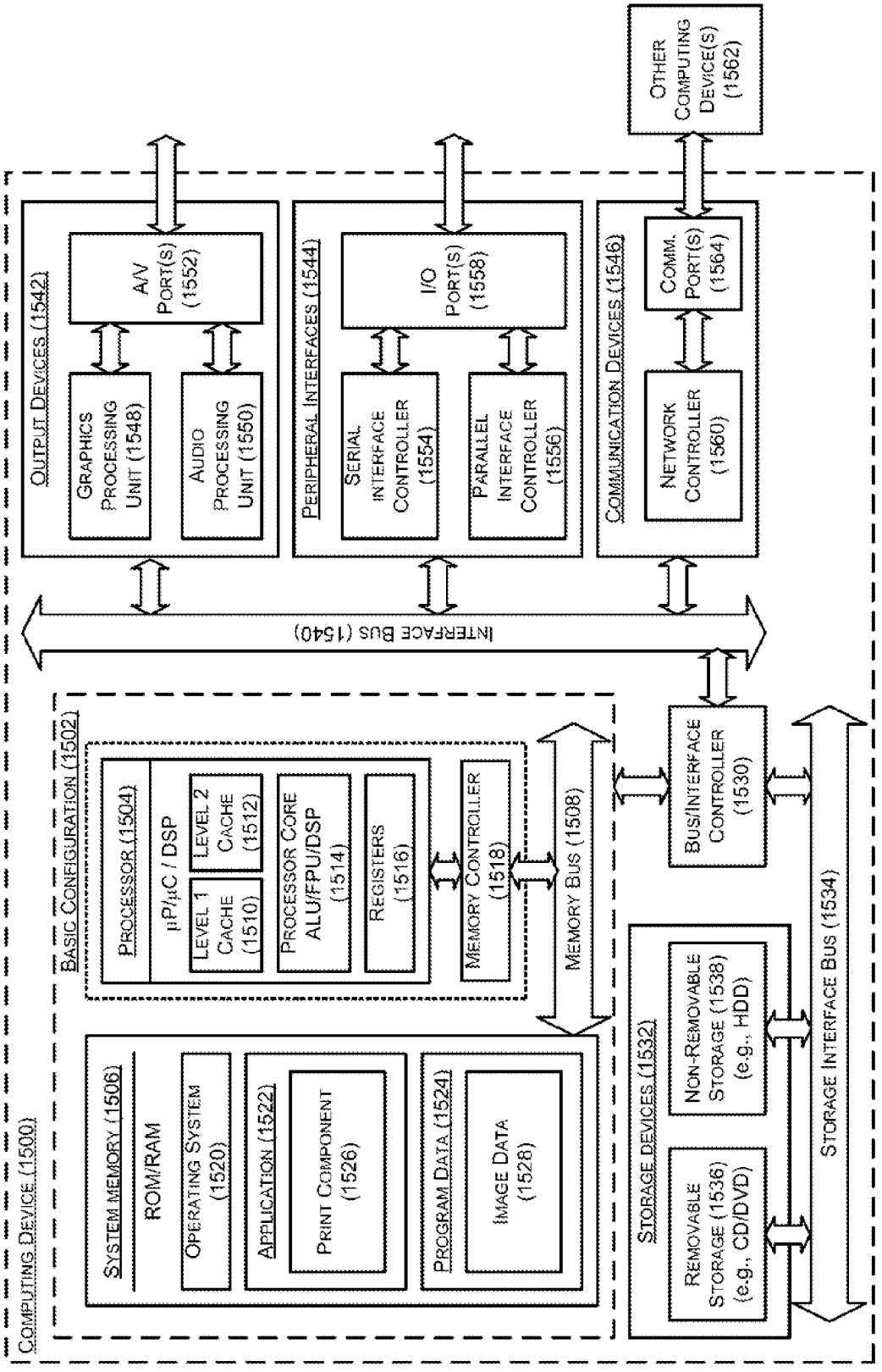
COMPUTING DEVICE (1500)
BASIC CONFIGURATION (1502)
PROCESSOR (1504)
μP/μC / DSP
LEVEL 1 CACHE (1510)
LEVEL 2 CACHE (1512)
PROCESSOR CORE ALU/FPU/DSP (1514)
REGISTERS (1516)
MEMORY CONTROLLER (1518)
SYSTEM MEMORY (1506)
ROM/RAM
OPERATING SYSTEM (1520)
APPLICATION (1522)
PRINT COMPONENT (1526)
PROGRAM DATA (1524)
IMAGE DATA (1528)
MEMORY BUS (1508)
INTERFACE BUS (1540)
OUTPUT DEVICES (1542)
GRAPHICS PROCESSING UNIT (1548)
AUDIO PROCESSING UNIT (1550)
A/V PORT(S) (1552)
PERIPHERAL INTERFACES (1544)
SERIAL INTERFACE CONTROLLER (1554)
PARALLEL INTERFACE CONTROLLER (1556)
I/O PORT(S) (1558)
COMMUNICATION DEVICES (1546)
NETWORK CONTROLLER (1560)
COMM. PORT(S) (1564)
OTHER COMPUTING DEVICE(S) (1562)
BUS/INTERFACE CONTROLLER (1530)
STORAGE DEVICES (1532)
REMOVABLE STORAGE (1536) (e.g., CD/DVD)
NON-REMOVABLE STORAGE (1538) (e.g., HDD)
STORAGE INTERFACE BUS (1534)

FIG. 15

VISUAL IMAGES PROCESSED ON PORTIONS OF FOLDED SUBSTRATE

CROSS-REFERENCE TO RELATED APPLICATIONS

This application is the National Stage filing under 35 U.S.C. §371 of PCT Application Ser. No. PCT/US2011/048155 filed on Aug. 17, 2011. The disclosure of the PCT Application is hereby incorporated herein by reference in its entirety.

BACKGROUND

People use various mobile devices to retrieve, capture, and send information. Digital cameras capture pictures and video. Global positioning system (GPS) units track location and give directions to a destination. Cellular phones can be used to exchange communications with other people, and many can now be used to also exchange electronic mail ("email"). People can also use these and other mobile devices to view and/or edit documents, e.g., letters.

While information is easily accessible in electronic form, people often have to wait to transfer this information to a hard copy. People who take pictures with digital cameras wait until they are at a store or a printer at home before they can make prints of pictures. People who type a letter on a mobile device may wait until they arrive at the office to print out a copy of their letter. People who retrieve online coupons on a data-enabled cell phone may wait until they get home to make printed copies.

Because of the specialized nature of these devices, many people often carry multiple mobile devices to fulfill their information needs. For example, people carry a cell phone to communicate with other people, but often carry a separate camera to take high-resolution pictures. Carrying multiple mobile devices can be problematic in several respects, e.g., portability, convenience, etc.

Handheld devices that are capable of capturing images and video are generally known in the art. Examples include personal digital assistants (PDAs), mobile telephones, and other "mobile computing devices." Some of these mobile computing devices are also capable of electronic communications, e.g., using wireless signals including signals conforming with IEEE 802.11 and cellular telephone standards. Some of these mobile computing devices can also compute geographic position information, e.g., by using GPS or signal triangulation techniques. However, convenient printing features are generally unavailable.

SUMMARY

Technology is described for a handheld device with multimedia content recording and printing ("the described technology"). In various embodiments, the described technology can capture and record images, video, and sound, e.g., by using an image capture sensor and/or scanner. In various embodiments, the described technology can print various types of images, e.g., photographs, postcards, legal documents, and so forth. The described technology also includes communications capabilities (e.g., wireless, cellular telephone, etc.) and position recognition capabilities (e.g., wireless triangulation, GPS, etc.).

The foregoing summary is illustrative only and is not intended to be in any way limiting. In addition to the illustrative aspects, embodiments, and features described above, further aspects, embodiments, and features will become apparent by reference to the drawings and the following detailed description.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a block diagram illustrating components employed by the technology in various embodiments.

FIG. **2** is a block diagram illustrating components employed by the technology in various embodiments.

FIG. **3** is a flow diagram illustrating a routine that the technology may invoke in various embodiments, e.g., to create electronic postcards.

FIG. **4** is a block diagram illustrating components employed by the technology in various embodiments.

FIG. **5** is a block diagram illustrating components employed by the technology in various embodiments.

FIG. **6** is a flow diagram illustrating a routine that the technology may invoke in various embodiments, e.g., to print legal documents.

FIG. **7** is a block diagram illustrating components employed by the technology in various embodiments.

FIG. **8** is a flow diagram illustrating a routine that the technology may invoke in various embodiments, e.g., to generate admission tickets to events.

FIG. **9** is a block diagram illustrating components employed by the technology in various embodiments.

FIG. **10** is a flow diagram illustrating a routine that the technology may invoke in various embodiments, e.g., to generate coupons.

FIG. **11** is a block diagram illustrating components employed by the technology in various embodiments.

FIG. **12** is a flow diagram illustrating components employed by the technology in various embodiments, e.g., to discourage theft of a mobile device.

FIG. **13** is a block diagram illustrating components employed by the technology in various embodiments.

FIG. **14** is a cross-sectional diagram of a mobile computing device illustrating a printer feature.

FIG. **15** is a block diagram of an illustrative embodiment of a computing device that is arranged in accordance with at least some embodiments of the present disclosure.

DETAILED DESCRIPTION

In the following detailed description, reference is made to the accompanying drawings, which form a part hereof. In the drawings, similar symbols typically identify similar components, unless context dictates otherwise. The illustrative embodiments described in the detailed description, drawings, and claims are not meant to be limiting. Other embodiments may be utilized, and other changes may be made, without departing from the scope of the subject matter presented herein. It will be readily understood that the aspects of the present disclosure, as generally described herein, and illustrated in the Figures, can be arranged, substituted, combined, separated, and designed in a wide variety of different configurations, all of which are explicitly contemplated herein.

Technology is described for a handheld device with multimedia content recording and printing ("the described technology"). In various embodiments, the described technology can capture and record images, video, and sound, e.g., by using an image capture sensor and/or scanner. In various embodiments, the described technology can print various types of images, e.g., photographs, postcards, legal documents, and so forth. The described technology also includes

communications capabilities (e.g., wireless, cellular telephone, etc.) and position recognition capabilities (e.g., wireless triangulation, GPS, etc.).

In various embodiments, the mobile computing device may have dimensions of approximately 6.5 inches in length, approximately 4.5 inches in width, and approximately 1.5 inches in depth. Mobile computing devices with these dimensions are comparable to the dimensions of cellular telephone ("smartphone") devices presently in popular use. Despite its relatively small size, the mobile computing device may be able to print on full size (e.g., 8.5 inches wide) paper or both sides of smaller sized paper (e.g., postcard-sized paper). The technology will be described in further detail in relation to the figures.

Turning now to the figures, FIG. **1** is a block diagram illustrating components **100** employed by the technology in various embodiments, e.g., in association with a mobile computing device (not illustrated). The components **100** include a core operating system **101** that is a general-purpose operating system or a special purpose operating system. As an example, the core operating system **101** can be an operating system specifically designed for use in mobile devices, e.g., a real-time operating system. The core operating system **101** may communicate with other components **100** of the technology and also with components not illustrated in FIG. **1**.

An iPostcard application **102** provides various features of the described technology, as described in further detail below. As an example, the iPostcard application **102** can be used by a user to generate an electronic postcard, affix an electronic stamp to the generated postcard, and print the postcard so that the user can mail the postcard using conventional mail methods. Thus, the iPostcard application **102** may interoperate with other components of the core operating system **101** to provide postcard-related features desired by the user.

A "Tuned-In" application **104** can provide sound recognition features to the core operating system **101**. As an example, the "Tuned-In" application **104** may recognize ambient sounds, provide speech recognition features, etc.

In various embodiments, the mobile device may also provide various entertainment features for users, e.g., electronic games **106** and a media player application **108**. The media player application **108** may be capable of rendering multimedia information, e.g., audio, video, etc.

The mobile computing device may include computer-readable storage devices, e.g., main memory **110**. The computer-readable storage devices can be implemented as various types of computer-readable media, e.g., non-volatile memory, optical memory, magnetic media, optical media, flash memory, or indeed any type of media on which program instructions or data may be stored and/or retrieved. The main memory **110** (or other computer-readable storage devices) can store various information, e.g., in various databases. As examples, the components **100** can include an image database **112**, a postcard database **114**, a media database **116**, and/or an address database **118**. The image database **112** may store images. As an example, the image database **112** may store images that the user has captured using a camera **122** or a scanner **126**. Alternatively, the image database **112** may store images that the user has downloaded to the mobile computing device, e.g., via a network controller **140** and/or wired or wireless communications means. Examples of wireless communications means are WiFi **142** (e.g., IEEE 802.11), 3G **144**, 4G **146**, Bluetooth **148**, etc.

The core operating system **101** may enable communications between various components **100**, e.g., via an input/output component **120**. Various input and/or output components may interoperate with other components **100** by communicating via the input/output component **120**. Examples of input/output components that the mobile computing device may include are the camera **122**, an RFID chip and/or detector/scanner **124**, the image scanner **126**, a microphone **128**, a GPS **130**, a touch screen **132**, a printer **134**, a display **136** (e.g., non-touch), and speakers **138**. The input/output component **120** may also communicate with a power manager **150**. The power manager **150** may employ solar panels **152** associated with the mobile computing device and/or a battery **154**. As an example, the power manager **150** may communicate battery level information, ambient light information, etc. The solar panels **152** can occupy portions of an exterior shell of the mobile computing device, e.g., portions not occupied by the display screen **136**. In various embodiments, the solar panels **152** may be attached in an extendable manner so that additional surface area may be exposed. As an example, several solar panels **152** may be hidden behind an outer shell and the user may extend the panels to minimize battery recharging time.

In various embodiments, the camera **122** may have a high quality zoom lens capable of zooming from a very wide angle field of view to a telephoto field of view. Alternatively, the camera **122** may have a fixed focal length lens.

In various embodiments, the touch screen **132** may enable a user to "write" on images using a freehand writing technique—with or without a stylus. As an example, a user may be able to electronically "write" a message on a postcard.

In various embodiments, the speakers **138** can include one or more transducer-type speakers, e.g., housed in a rear portion of the mobile computing device. When the mobile computing device is placed on a surface, e.g., a rigid surface, the transducer-type speaker may generate a more significant bass sound than conventional speakers associated with mobile computing devices or headsets.

In various embodiments, the mobile computing device may include two or more batteries. As an example, a battery **154** may be a removable battery but a second battery (not illustrated) may be a battery that is not removable. That way, if the mobile computing device needs to power a feature (e.g., to power security functions), the mobile computing device does not need to depend on the presence of the removable battery or solar power. In various embodiments, the non-removable battery may be a rechargeable battery that can be recharged at the same time as the removable battery or at other times.

In various embodiments, the mobile computing device may communicate with other components and devices (not illustrated). As an example, the mobile computing device may be capable of printing to an external printer, e.g., by transmitting images to the external printer. The transmissions can be via wireless communications, wired communications, etc. Various protocols can be used to transmit images including, e.g., Picture Transfer Protocol. As another example, the mobile computing device may be capable of receiving images via a USB connection or a removable storage device (e.g., Compact Flash ("CF") or Secure Digital or ("SD") card), etc.

FIG. **2** is a block diagram illustrating components **200** employed by the technology in various embodiments. The figure provides a simplified view of some of the components **100** illustrated in FIG. **1**. The components **200** can include user interfaces **201**, digital cameras **202**, memories **204**, core applications **206**, input/output interfaces and decoders **208**, printers **210**, libraries **212**, and wireless connection interfaces **214**. The libraries **212** provide various common routines, e.g., to the applications **206**.

FIG. **3** is a flow diagram illustrating a routine **300** that the technology may invoke in various embodiments, e.g., to cre-

ate electronic postcards. The routine begins at block **301**. The routine then continues at block **302**, where the routine receives an image. As an example, the routine may receive an image from a camera, a scanner, or from a different component associated with the mobile computing device. The routine then continues at decision block **304**, where the routine determines whether it has received an indication from a user that the received image needs editing. If that is the case, the routine continues at block **306**. Otherwise, the routine continues at block **308**. At block **306**, the routine receives edits to the received image. As examples, the routine may receive instructions to crop the image, enhance the image, rotate the image, combine the image with other images, etc. These edits may make the received image suitable for printing on a postcard. The routine then continues at block **308**. At block **308**, the routine creates a postcard from the received (and possibly edited) image. The routine then continues at block **310**. At block **310**, the routine determines the geographical location at which the mobile computing device is presently being operated. As an example, the routine may receive this information from a GPS unit **312**. The routine then continues at block **314**. At block **314**, the routine receives a selection of postal service information from the user. As an example, the routine may receive an instruction from the user indicating that the postcard is to be sent via first class mail. The routine then continues at block **316**. At block **316**, the routine charges an online postage account **318** associated with the user, e.g., for the value of postage and possibly for handling fees. The user's online postage account **318** may be able to receive additional funds, if necessary, from the user's bank account **320**. Thus, for example, when the user is traveling and unable to access an automated teller machine or bank institution, the user may nevertheless still be able to send postcards via conventional mail. The routine then continues at block **322**. At block **322**, the routine prints the postcard, perhaps with an appropriate postage stamp. As an example, the routine may cause a printer associated with the mobile computing device to print the postcard. The routine then ends at block **324**.

In various embodiments, the described technology enables users to electronically select and affix stamps bearing various images. Printing and mailing postcards may be attractive to some users who reminisce about affixing postage stamps bearing an image of a local landmark. For example, users traveling to Egypt may want to add postage stamps bearing an image of pyramids.

In various embodiments, the routine may download photographs from a digital camera, e.g., using a Picture Transfer Protocol, so that the user can create a postcard from a photograph taken with a different camera.

Those skilled in the art will appreciate that the logic illustrated in FIG. **3** and described above, and in each of the flow diagrams discussed below, may be altered in a variety of ways. For example, the order of the logic may be rearranged, sublogic may be performed in parallel, illustrated logic may be omitted, other logic may be included, etc. In various embodiments, portions of the routine may be executed by a server computing device, a client computing device, or other computing devices.

FIG. **4** is a block diagram illustrating components **400** employed by the technology in various embodiments. The components include a camera **401** and an image database **402**. As previously explained, in some embodiments, the image database **402** may store images received from the camera **401**. In other embodiments (not illustrated), the image database **402** may receive and store images from a scanner or other input devices. As an example, the image database **402** may store still images retrieved from a video sequence. The user may employ an image editor **404** to modify images stored in the image database **402**, e.g. to prepare an image for printing as a postcard. A postcard generator **406** can employ images stored in the image database **402** to generate postcards. The postcard generator **406** may employ address book entries stored in an address book database **408**, e.g., so that the user does not need to remember and/or write down names and addresses of people to whom the user desires to send postcards. The postcard generator **406** may store generated postcards in a postcard database **416**. The postcard generator **406** may also retrieve templates for postcards from the postcard database **416**. The generated postcards may then be printed to a printer **418** associated with the mobile computing device. In various embodiments, a stamp generator **410** may generate stamps based on the current geographical position of the mobile computing device, e.g., based on information received from a GPS unit **412**. The stamp generator **410** may debit an online account **414** of the user, e.g., based on the value of the stamp. The stamp generator **410** may also generate stamp images for use by the postcard generator **406** to include with the postcard.

FIG. **5** is a block diagram illustrating components **500** employed by the technology in various embodiments. The figure provides a simplified view of some of the components **100** illustrated in FIG. **1**. A user interface component **501** provides a user interface that a user may use to interact with various components of the described technology. As examples, the user interface component **501** enables the user to interact with an address book component **502**, a postcard component **506**, and an image component **510**. The address book component **502** enables interactions with an address database **504**, e.g., to retrieve and/or store postal address information. The postcard component **506** enables interactions with a postcard database **508**, e.g., to retrieve and/or store postcards, postcard templates, etc. The image component **510** enables interactions with an image database **512**, e.g., to retrieve and/or store images. The address book component **502**, postcard component **506**, and image component **510** may function as components of a core application **516**, e.g., in conjunction with libraries **514**.

FIG. **6** is a flow diagram illustrating a routine **600** that the technology may invoke in various embodiments, e.g., to print legal documents. The routine begins at block **601**. The routine then continues at block **602**. At block **602**, the routine determines which legal documents may be required for the country in which the user is presently located. As an example, the routine may retrieve geographical position information, e.g., from a GPS unit **604**. The routine may provide the position information to a server and receive a list of documents from the server. Examples of such legal documents include, e.g., passports, visas, driver's licenses, etc. The routine then continues at block **606**. At block **606**, the routine receives selections from the user indicating which documents the user may need or desire. As an example, a user may have misplaced a subset of the required set of documents and may indicate the needed subset. The routine then continues at block **608**. At block **608**, the routine retrieves the selected documents. As an example, the routine may retrieve the documents from a server. For example, the routine may identify a suitable government agency (e.g., nearest embassy), contact a server associated with the embassy, and retrieve documents from the server of the embassy. Alternatively, the routine may retrieve documents from a document database **610**. The routine then continues at block **612**. At block **612**, the routine prints the retrieved documents. The routine then ends at block **614**.

FIG. **7** is a block diagram illustrating components **700** employed by the technology in various embodiments. The

components **700** can include a GPS unit **701**, a document management application **702**, a document database **704**, and a printer **706**. The document management application **702** may receive geographical position information from the GPS unit **701**, retrieve documents from the document database **704**, and print the retrieved documents using the printer **706**.

FIG. **8** is a flow diagram illustrating a routine **800** that the technology may invoke in various embodiments, e.g., to generate admission tickets to events. The routine begins at block **801**. The routine then continues at block **802**. At block **802**, the routine identifies shows near a user's current location. As an example, the routine may receive position information from a GPS unit **804**. Alternatively, the routine may receive an indication of a future position from the user. The routine may retrieve a listing of shows at the position information identified by either the GPS unit or the user, e.g., from an online listing of shows **806**. The routine then continues at block **808**, where it displays options to a user, e.g., locations of shows, content of shows, timing of shows, etc. The routine then continues at block **810**, where it receives one or more selections of shows from the user. The routine then continues at block **812**, where it may receive an indication from the user to purchase tickets for selected shows. If that is the case, the routine may employ a ticket sales website **814** to purchase tickets and may employ a user's bank account **816** to pay for the tickets. The routine then continues at block **818**, where it prints the purchased tickets. The routine then ends at block **820**.

FIG. **9** is a block diagram illustrating components **900** employed by the technology in various embodiments. A GPS unit **901** may provide geographical position information, e.g., to a ticket locator application **902**. The ticket locator application **902** may retrieve online listings from a database **904**, and employ services of a ticket sales Web service or website **906** to purchase tickets. The ticket locator application **902** may then print the purchased tickets at a printer **908**.

FIG. **10** is a flow diagram illustrating a routine **1000** that the technology may invoke in various embodiments, e.g., to generate coupons. The routine begins at block **1001**. The routine then continues at block **1002**, where it scans an item. As an example, a user may use the mobile computing device to scan an item's barcode (or other aspects of the item, e.g., its label or shape) using a camera built into the mobile computing device, an RFID detector built into the mobile computing device, or by using other means associated with the mobile computing device. As examples, the mobile computing device may employ an RFID-enabled microelectromechanical system (MEMS) device **1004** or a camera **1006** to identify an item. The routine then continues at decision block **1008**, where the routine determines whether a coupon is available for the scanned item. If the routine determines that a coupon is available, the routine continues at block **1010**. Otherwise, the routine continues at block **1012**. At block **1010**, the routine prints the available coupon. At block **1012**, the routine translates the label on the item and pricing information. As an example, when the user is traveling, the user may be unable to read the item's label because the label is in a foreign language. Moreover, the user may find it difficult to easily convert pricing information into a currency with which the user is familiar. As an example, when the user is traveling in the Middle East, an item's label may only be in Arabic and the pricing information may be in a local currency. However, the user may be able to read only English and may desire to see the price converted to dollars or euros. The routine may translate the information either using software installed on the mobile computing device or by transmitting information to a server that returns a translated result. The routine then continues at block **1014**, where it displays the translated information. The routine then continues at decision block **1016**, where it determines whether there are more items to be scanned. If there are more items to be scanned, the routine continues at block **1002**. Otherwise, the routine ends at block **1018**.

In various embodiments, the described technology enables a user to see what offers or coupons a particular store or merchant has. The user can use a camera to capture an image of the storefront and, using GPS location information and image recognition, the routine can identify the store and retrieve coupons or advertisements pertinent to the store.

FIG. **11** is a block diagram illustrating components **1100** employed by the technology in various embodiments. The components **1100** can include an RFID scanner (e.g., an RFID-enabled MEMS scanner) **1101** and a camera **1102**, e.g., to identify a particular item. An input database **1104** may retrieve and/or store information contained in RFID tags associated with products by using the scanner **1101** and/or item information retrieved via an image captured by the camera **1102**. A coupon generator component **1106** may retrieve coupons from an online coupon directory **1108**, e.g., based on the identification(s) stored in the input database **1104**. The coupon generator **1106** may print coupons, e.g., at a printer **1110**. A translator component **1112** may translate information (e.g., labels, pricing, ingredients, etc.), stored in the input database **1104**.

FIG. **12** is a flow diagram illustrating a routine **1200** employed by the technology in various embodiments, e.g., to discourage theft of a mobile device. The routine begins at block **1201**. The routine then continues at block **1202**. At block **1202**, the routine determines whether alarm conditions have been triggered. As an example, the routine may determine that an alarm condition has been triggered when the mobile computing device is removed from a particular geographical area. Alternatively, the routine may determine that the mobile computing device is in an area in which an owner of the mobile computing device typically does not visit. The routine may make a determination, e.g., based on inputs from a camera **1204** (unfamiliar surroundings) or a microphone **1206** (unfamiliar sounds). Alternatively, the owner may have indicated that the feature is to be enabled until the owner turns off the security feature. In such a case, the routine may determine that the alarm condition is triggered based on inputs from the camera or the microphone because images and/or ambient sound conditions may change during or after the theft. The routine then continues at decision block **1208**, where the routine determines whether a silent mode has been enabled. If the silent mode has been enabled, the routine continues at block **1212**. Otherwise, the routine continues at block **1210**. If the silent mode is not enabled, the routine plays a loud audible alarm at block **1210**. The routine then continues at block **1212**. At block **1212**, the routine sends an alert to the owner via various communications means. As examples, the routine may alert the owner by using a Bluetooth connection or WiFi network (as illustrated in block **1212**); via email (as illustrated in block **1214**), or indeed via any communications means available to the mobile computing device (e.g., SMS texting, etc.). The routine then continues at decision block **1216**, where the routine determines whether the owner has indicated that a broadcast message is to be sent. If the routine determines that a broadcast message is to be sent, the routine continues at block **1218**. Otherwise, the routine continues at block **1220**. At block **1218**, the routine plays a broadcast message. As an example, the routine may make several telephone calls and play the broadcast message to each person who responds to the placed telephone calls. The

routine then continues at block **1220**. At block **1220**, the routine captures an image of the current surroundings, e.g. using the camera **1204**. The routine then continues at block **1222**, where it broadcasts the images, e.g., to a secure website. That way, people viewing the secure website may be able to determine where the mobile computing device is presently located. The routine then continues at decision block **1224**, where the routine determines whether a user has shut off the alarm, e.g., by entering a password. If the user has shut off the alarm, the routine ends at block **1226**. Otherwise, the routine continues at block **1220**. In various embodiments, the routine may also receive geographical position information, e.g., from a GPS, and transmit the geographical position information.

In various embodiments, the routine may identify an alarm condition when it detects motion and the user has not turned off an alarm feature within a specified time period. If the alarm condition is satisfied, then the mobile computing device may sound a load alarm, transmit messages, etc., to indicate that the mobile computing device may be in the process of being stolen. The device may detect motion using its MEMS sensors, comparing a present image received by the camera to a previous image received when the device was stationary, etc.

FIG. **13** is a block diagram illustrating components **1300** employed by the technology in various embodiments. The components include a security monitor application **1301**. The security monitor application **1301** can capture live audio via a microphone **1302** and live video from a camera **1304**, e.g., to determine whether alarm conditions have been met. If alarm conditions have been met, the security monitor application **1301** may trigger alarm application **1306** to transmit the alarms. The alarm application **1306** may employ speakers **1308** to play loud alarms, broadcast messages, etc.; a secure website **1314**, e.g., to broadcast images; an email application **1310**, e.g., to transmit email messages; and a Bluetooth or WiFi component **1312** to transmit wireless messages.

FIG. **14** is a cross-sectional diagram of a mobile computing device **1400** illustrating a printer feature. The mobile computing device **1400** is illustrated in a cross sectional view **1402**. In this view, the mobile computing device includes a top **1402***a*, a side **1402***b*, and a bottom **1402***c*. The mobile computing device **1400** may have an opening (or "gap region") **1408** that has a first surface partition ("wall portion") **1408***a* and a second surface partition **1408***c*. The first surface partition **1408***a* and the second surface partition **1408***c* may be connected via a surface **1408***b*. The opening is configured to receive a document page or other substrate **1404**. The substrate **1404** can be folded, thereby having a first surface **1404***a*, a second surface **1404***b*, and a third surface **1404***c*. When so inserted, a printer head ("graphical processing head") **1406** is capable of traveling around the substrate, e.g., along surfaces **1408***a*, **1408***b*, and **1408***c*, thereby to print on the substrate surfaces **1404***c*, **1404***b*, and **1404***a*, respectively. Because a folded substrate, e.g., a folded paper, occupies much less surface area than a full sheet, the illustrated printer can occupy a small amount of space (e.g., the size of a mobile computing device), yet print on a full sheet of paper. As an example, the mobile computing device may have dimensions of approximately 4.5 inches along the top and bottom **1402***a* and **1402***c*; and approximately 1.5 inches along side **1402***b*. Moreover, by printing along surface **1404***b*, the printer can print along the outside crease of the folded substrate so that when the substrate **1404** is flattened, there is no gap in the printout. In various embodiments, the printer head **1406** may be capable of scanning the substrate **1404** to create a digital image.

One skilled in the art will appreciate that the printer head **1406** can be a dot matrix head, ink jet head, laser printer head, or indeed any other type of printer head. Moreover, one skilled in the art will appreciate that various electromechanical linkages are not illustrated, e.g., linkages that would permit the printer head **1406** to travel along surfaces **1408***a*, **1408***b*, and **1408***c*.

In some embodiments, the mobile computing device **1400** can interface with a "snap-in" docking tray that adds depth but not circumference. The docking tray can house various substrates **1404** (e.g., card stock, photographic paper, printing paper, etc.), whether blank or preprinted, and automatically feed the printer. As an example, a user may insert postcards with preprinted stamps.

FIG. **15** is a block diagram illustrating an example computing device **1500** that is arranged in accordance with at least some embodiments of the present disclosure. In a very basic configuration **1502**, computing device **1500** typically includes one or more processors **1504** and a system memory **1506**. A memory bus **1508** may be used for communicating between processor **1504** and system memory **1506**.

Depending on the desired configuration, processor **1504** may be of any type including but not limited to a microprocessor (μP), a microcontroller (μC), a digital signal processor (DSP), or any combination thereof. Processor **1504** may include one more levels of caching, such as a level one cache **1510** and a level two cache **1512**, a processor core **1514**, and registers **1516**. An example processor core **1514** may include an arithmetic logic unit (ALU), a floating point unit (FPU), a digital signal processing core (DSP Core), or any combination thereof. An example memory controller **1518** may also be used with processor **1504**, or in some implementations memory controller **1518** may be an internal part of processor **1504**.

Depending on the desired configuration, system memory **1506** may be of any type including but not limited to volatile memory (such as RAM), non-volatile memory (such as ROM, flash memory, etc.) or any combination thereof. System memory **1506** may include an operating system **1520**, one or more applications **1522**, and program data **1524**. Application **1522** may include a print component **1526** that is arranged to print documents or two sides of a substrate, including a folded side. Program data **1524** may include image data **1528**, as is described herein. In some embodiments, application **1522** may be arranged to operate with program data **1524** on operating system **1520** such that printing can occur across a fold if a folded page without loss of image quality. This described basic configuration **1502** is illustrated in FIG. **15** by those components within the inner dashed line.

Computing device **1500** may have additional features or functionality, and additional interfaces to facilitate communications between basic configuration **1502** and any required devices and interfaces. For example, a bus/interface controller **1530** may be used to facilitate communications between basic configuration **1502** and one or more data storage devices **1532** via a storage interface bus **1534**. Data storage devices **1532** may be removable storage devices **1536**, non-removable storage devices **1538**, or a combination thereof. Examples of removable storage and non-removable storage devices include magnetic disk devices such as flexible disk drives and hard-disk drives (HDD), optical disk drives such as compact disk (CD) drives or digital versatile disk (DVD) drives, solid state drives (SSD), and tape drives to name a few. Example computer storage media may include volatile and nonvolatile, removable and non-removable media implemented in any method or technology for storage of informa-

tion, such as computer readable instructions, data structures, program modules, or other data.

System memory **1506**, removable storage devices **1536** and non-removable storage devices **1538** are examples of computer storage media. Computer storage media includes, but is not limited to, RAM, ROM, EEPROM, flash memory or other memory technology, CD-ROM, digital versatile disks (DVD) or other optical storage, magnetic cassettes, magnetic tape, magnetic disk storage or other magnetic storage devices, or any other medium which may be used to store the desired information and which may be accessed by computing device **1500**. Any such computer storage media may be part of computing device **1500**.

Computing device **1500** may also include an interface bus **1540** for facilitating communication from various interface devices (e.g., output devices **1542**, peripheral interfaces **1544**, and communication devices **1546**) to basic configuration **1502** via bus/interface controller **1530**. Example output devices **1542** include a graphics processing unit **1548** and an audio processing unit **1550**, which may be configured to communicate to various external devices such as a display or speakers via one or more A/V ports **1552**. Example peripheral interfaces **1544** include a serial interface controller **1554** or a parallel interface controller **1556**, which may be configured to communicate with external devices such as input devices (e.g., keyboard, mouse, pen, voice input device, touch input device, etc.) or other peripheral devices (e.g., printer, scanner, etc.) via one or more I/O ports **1558**. An example communication device **1546** includes a network controller **1560**, which may be arranged to facilitate communications with one or more other computing devices **1562** over a network communication link via one or more communication ports **1564**.

The network communication link may be one example of a communication media. Communication media may typically be embodied by computer readable instructions, data structures, program modules, or other data in a modulated data signal, such as a carrier wave or other transport mechanism, and may include any information delivery media. A "modulated data signal" may be a signal that has one or more of its characteristics set or changed in such a manner as to encode information in the signal. By way of example, and not limitation, communication media may include wired media such as a wired network or direct-wired connection, and wireless media such as acoustic, radio frequency (RF), microwave, infrared (IR) and other wireless media. The term computer readable media as used herein may include both storage media and communication media.

Computing device **1500** may be implemented as a portion of a small-form factor portable (or mobile) electronic device such as a cell phone, a personal data assistant (PDA), a personal media player device, a wireless web-watch device, a personal headset device, an application specific device, or a hybrid device that include any of the above functions. Computing device **1500** may also be implemented as a personal computer including both laptop computer and non-laptop computer configurations.

In various embodiments, a graphical processing device comprises a processing port having a first wall portion spaced apart from a second wall portion to define a gap region therebetween, wherein the gap region is configured to receive a folded substrate having a first surface portion facing the first wall portion, a second surface portion facing the second wall portion, and a folded surface portion extending therebetween; and at least one graphical processing head movably disposed proximate the processing port, wherein the at least one graphical processing head is configured to process visual images on the first and second surface portions of the folded substrate when the folded substrate is disposed in the gap region. The graphical processing head can be configured to process contiguous visual images on the first, second, and folded surface portions of the folded substrate when the folded substrate is disposed in the gap region. The graphical processing head can include a print head configured to print contiguous visual images on the first, second, and folded surface portions of the folded substrate when the folded substrate is disposed in the gap region. The folded substrate can be a preprinted substrate containing contiguous visual images on the first, second, and folded surface portions thereof, and the graphical processing head can include a scanner configured to scan the contiguous visual images on the first, second, and folded surface portions of the folded substrate when the folded substrate is disposed in the gap region.

In various embodiments, a printer can comprise a printing port having a first guide wall spaced apart from a second guide wall to define a gap region therebetween, wherein the gap region is configured to receive a folded piece of paper having a first surface portion facing the first guide wall, a second surface portion facing the second guide wall, and a folded surface portion extending between the first and second surface portions; and at least one print head movably disposed proximate the printing port, wherein the at least one print head is configured to print contiguous visual images on the first, second, and folded surface portions of the folded piece of paper when the folded piece of paper is received in the gap region. The printing port can be configured to receive a folded sheet of paper that is at least 6 inches wide. The printing port can include an end wall extending between the first and second guide walls opposite an opening, and the end wall can be spaced apart from the opening by at least 6 inches. The print head can be movably coupled proximate the first guide wall for printing the contiguous visual images on the first surface portion, and the at least one print head can be movably coupled proximate the second guide wall for printing the contiguous visual images on the second surface portion. The printing port can include an end wall extending between the first and second guide walls opposite an opening, and the print head can be a single print head configured to traverse the first guide wall, the second guide wall, and the end wall as the single print head prints the contiguous visual images on the first, second, and folded surface portions of the folded piece of paper. A paper cartridge may be positioned proximate the printing port and configured to hold a plurality of folded pieces of paper. The print head can include a visual image scanner. The printer can include a processor operably coupled to memory and the print head, wherein the print head is configured to print an image stored in memory on the first, second, and folded surface portions of the folded piece of paper in response to instructions from the processor. The printer can also include a camera; and a processor configured to store a digital image from the camera in memory, wherein the print head is configured to print the digital image on the first, second, and folded surface portions of the folded piece of paper in response to instructions from the processor.

In various embodiments, the described technology includes a scanner having a folded piece of paper having a first surface portion facing a first direction, a second surface portion facing a second direction opposite the first direction, and a folded surface portion extending between the first and second surface portions proximate an end wall of the slot; and at least one scan head movably disposed proximate the scanning slot, wherein the at least one scan head is configured to scan visual images on the first, second, and folded surface portions of the folded piece of paper when the folded piece of paper is disposed in the gap region.

In various embodiments, the technology includes a handheld mobile computing device having a printing port configured to receive a folded piece of paper having a first surface portion facing a first direction, a second surface portion facing a second direction opposite the first direction, and a folded surface portion extending between the first and second surface portions; and at least one print head movably disposed proximate the printing port, wherein the at least one print head is configured to print visual images on the first, second, and folded surface portions of the folded piece of paper when the folded piece of paper is received in the printing port. The handheld mobile device can include a camera, wherein the print head is configured to print visual images from the camera on the first, second, and folded surface portions of the folded piece of paper when the folded piece of paper is received in the printing port. The handheld mobile device can include a zoom lens capable of zooming from a wide angle to a telephoto angle. The handheld mobile device can include a wireless Internet access facility, wherein the print head is configured to print visual images downloaded via the wireless Internet facility on the first, second, and folded surface portions of the folded piece of paper when the folded piece of paper is received in the printing port. The handheld mobile device can include a microphone component and a speaker component. The measurements of the handheld mobile device may be less than 7 inches in a first dimension, less than 5 inches in a second dimension, and less than 2 inches in a third dimension. The handheld mobile device can include a microelectromechanical system (MEMS) configured to detect movement and/or orientation of the handheld mobile device. The handheld mobile device can include a display, wherein an orientation of an image rendered on the display is modified based on a signal received from the MEMS. The handheld mobile device can include a removably attached tray capable of housing zero or more pieces of paper.

In various embodiments, the disclosed technology performs a method, comprising: receiving a graphical image from an image capture device; receiving an electronic stamp; electronically affixing the received electronic stamp to the received graphical image to create a stamped graphical image; and printing on a printer the stamped graphical image. The method can include receiving information indicating a first current geographical position of the graphical communications device and requesting a first electronic stamp from a first agency authorized to provide electronic stamps suitable for postage in a first jurisdiction covering the indicated current geographical position. The method can include receiving information indicating a second current geographical position of the graphical communications device and requesting a second electronic stamp from a second agency authorized to provide electronic stamps suitable for postage in a second jurisdiction covering the indicated current geographical position, wherein the second stamp is different from the first stamp and the second agency is different from the first agency. The method can include deducting from an account charges relating to the first electronic stamp and the second electronic stamp. The electronic stamp can include an image representative of the first jurisdiction. The graphical image may be received from an image capture device that is internal to the graphical communications device. The graphical image may be received from an image capture device that is external to the graphical communications device. The graphical image may be received from the graphical communications device using a picture transfer protocol. The method can include determining an amount of postage. The printer can be internal to the graphical communications device. The printer can be external to the graphical communications device. The method can include receiving a postprocessing command and applying the received postprocessing command to the graphical image. The method can include receiving in image of a product label associated with a product. The method can include converting a price to a different currency than a currency indicated on the product label. The method can include displaying a menu including at least the product. The method can include printing a coupon for the product.

In various embodiments, the technology includes a system for handling images, comprising: a processor and memory; a component configured to store an address book; a component configured to provide a user interface; a component configured to receive an image; a component configured to postprocess the received image; a component configured to receive an electronic stamp; a component configured to add the received electronic stamp to the received image; and a component configured to print the received image. The system can include a component configured to detect motion. The component can include a microelectromechanical system (MEMS). The component configured to detect motion can transmit a signal indicating that the system for handling images is being moved. The system can include a component configured to transmit the received image. The received image may be transmitted wirelessly. The system can include a display, a speaker, and a microphone. The system can include a speech-to-text component and a translator component, wherein the system is configured to receive speech, convert the received speech to text, and translate the converted text to a different natural language than a natural language of the text. The system can include solar panels configured to recharge a power source. The system can include two displays, wherein one of the two displays is configured to be slid out from a main body. The system can include a virtual keyboard displayed on at least one of the two displays, wherein the at least one of the two displays is a touch-sensitive display.

In various embodiments, the mobile computing device can be used to enlarge documents. As an example, the mobile computing device can enlarge documents that are difficult to read. The mobile computing can enlarge text and other information captured by its camera, and display the enlarged information on its display. The mobile computing device may also translate the displayed information into a language with which the user is familiar.

In various embodiments, the mobile computing device includes a voice recognition system that receives speech from a speaker in one language, recognizes the received speech, translates the recognized speech into a different language, and displays the translated speech. Alternatively, the mobile computing device can render the translated speech audibly, e.g., using a text-to-speech component. Thus, the mobile computing device can be used by a user to understand communications from someone speaking a different language than the language with which the user is familiar. The mobile computing device can also be used to translate the user's speech for the benefit of the original speaker. As an example, the user can type in or speak a statement in the user's language and the mobile computing device can translate the statement into a different language. The text-to-speech component may even be able to mimic a local accent of native speakers of the language.

In various embodiments, the mobile computing device can be used to provide travel directions, keep track of position, etc. The mobile computing device can use GPS or triangulation techniques to compute its position.

In various embodiments, the mobile computing device can be used as a game console input device. As an example, the

mobile computing device can broadcast movement information detected using its MEMS sensors, display controls on its screen, and receiving inputs from the user.

In various embodiments, the mobile computing device can include two display screens and a keyboard that can slide into a cavity when not in use to become hidden. The keyboard may be foldable so that the sizes of keys can be maximized. When the keyboard is folded, only some keys may be accessible. When the keyboard is unfolded, other keys may become accessible. When both screens are displayed and the keyboard is fully unfolded, the device may have a width of approximately 12 inches. In various embodiments, the second screen can replace the keyboard entirely by employing a touch screen with virtual keys. Thus, the user can use booth screens for display and when a keyboard is needed, either or both screens can display the keyboard. In various embodiments, the screens may provide a three-dimensional display, e.g., with or without use of other visual aids.

In various embodiments, two screens may be configured in a paperback book configuration so that text flows across both screens. The two screens could be oriented with a long dimension vertically. Then each page could be displayed on one or both screens, and virtual buttons can be displayed to enable the user to "turn" pages.

In various embodiments, various components may provide input instead of (or in addition to) users. As an example, some user actions need not be provided by a user but may be provided by other sources, e.g., an automation component.

From the foregoing, it will be appreciated that various embodiments of the present disclosure have been described herein for purposes of illustration, and that various modifications may be made without departing from the scope of the present disclosure. Accordingly, the various embodiments disclosed herein are not intended to be limiting, with the true scope being indicated by the following claims.

I claim:

1. A graphical processing device, comprising:

a processing port having a first wall portion spaced apart from a second wall portion to define a gap region therebetween, wherein the gap region is configured to receive a folded substrate having a first surface portion facing the first wall portion, a second surface portion facing the second wall portion, and a folded surface portion extending therebetween; and

at least one graphical processing head movably disposed proximate the processing port, wherein the at least one graphical processing head is configured to process visual images on the first, second, and folded surface portions of the folded substrate when the folded substrate is disposed in the gap region.

2. The graphical processing device of claim **1**, wherein the at least one graphical processing head is further configured to process contiguous visual images on the first, second, and folded surface portions of the folded substrate when the folded substrate is disposed in the gap region.

3. The graphical processing device of claim **1**, wherein the at least one graphical processing head includes a print head configured to print contiguous visual images on the first, second, and folded surface portions of the folded substrate when the folded substrate is disposed in the gap region.

4. The graphical processing device of claim **1**, wherein the folded substrate is a preprinted substrate containing contiguous visual images on the first, second, and folded surface portions thereof, and wherein the at least one graphical processing head includes a scanner configured to scan the contiguous visual images on the first, second, and folded surface portions of the folded substrate when the folded substrate is disposed in the gap region.

5. A printer, comprising:

a printing port having a first guide wall spaced apart from a second guide wall to define a gap region therebetween, wherein the gap region is configured to receive a folded piece of paper having a first surface portion facing the first guide wall, a second surface portion facing the second guide wall, and a folded surface portion extending between the first and second surface portions; and

at least one print head movably disposed proximate the printing port, wherein the at least one print head is configured to print contiguous visual images on the first, second, and folded surface portions of the folded piece of paper when the folded piece of paper is received in the gap region.

6. The printer of claim **5**, wherein the printing port is configured to receive a folded sheet of paper that is at least 6 inches wide.

7. The printer of claim **5**, wherein the printing port includes an end wall extending between the first and second guide walls opposite an opening, and wherein the end wall is spaced apart from the opening by at least 6 inches.

8. The printer of claim **5**, wherein the at least one print head is movably coupled proximate the first guide wall for printing the contiguous visual images on the first surface portion, and wherein the at least one print head is movably coupled proximate the second guide wall for printing the contiguous visual images on the second surface portion.

9. The printer of claim **5**, wherein the printing port includes an end wall extending between the first and second guide walls opposite an opening, and wherein the at least one print head is a single print head configured to traverse the first guide wall, the second guide wall, and the end wall as the single print head prints the contiguous visual images on the first, second, and folded surface portions of the folded piece of paper.

10. The printer of claim **5**, further comprising a paper cartridge positioned proximate the printing port and configured to hold a plurality of folded pieces of paper.

11. The printer of claim **5**, wherein the at least one print head includes a visual image scanner.

12. The printer of claim **5**, further comprising a processor operably coupled to memory and the at least one print head, wherein the at least one print head is configured to print an image stored in memory on the first, second, and folded surface portions of the folded piece of paper in response to instructions from the processor.

13. The printer of claim **5**, further comprising:

a camera; and

a processor configured to store a digital image from the camera in memory, and wherein the at least one print head is configured to print the digital image on the first, second, and folded surface portions of the folded piece of paper in response to instructions from the processor.

14. A scanner, comprising:

a scanning slot configured to receive a folded piece of paper having a first surface portion facing a first direction, a second surface portion facing a second direction opposite the first direction, and a folded surface portion extending between the first and second surface portions proximate an end wall of the scanning slot; and

at least one scan head movably disposed proximate the scanning slot, wherein the at least one scan head is configured to scan visual images on the first, second, and

folded surface portions of the folded piece of paper when the folded piece of paper received in the scanning slot.

15. A handheld mobile device, comprising:

a printing port configured to receive a folded piece of paper having a first surface portion facing a first direction, a second surface portion facing a second direction opposite the first direction, and a folded surface portion extending between the first and second surface portions; and

at least one print head movably disposed proximate the printing port, wherein the at least one print head is configured to print visual images on the first, second, and folded surface portions of the folded piece of paper when the folded piece of paper is received in the printing port.

16. The handheld mobile device of claim **15**, further comprising a camera, wherein the at least one print head is configured to print visual images from the camera on the first, second, and folded surface portions of the folded piece of paper when the folded piece of paper is received in the printing port.

17. The handheld mobile device of claim **16**, further comprising a zoom lens capable of zooming from a wide angle to a telephoto angle.

18. The handheld mobile device of claim **15**, further comprising a wireless Internet access facility, wherein the at least one print head is configured to print visual images downloaded via the wireless Internet facility on the first, second, and folded surface portions of the folded piece of paper when the folded piece of paper is received in the printing port.

19. The handheld mobile device of claim **15**, further comprising a microphone component and a speaker component.

20. The handheld mobile device of claim **19**, wherein measurements of the handheld mobile device are less than 7 inches in a first dimension, less than 5 inches in a second dimension, and less than 2 inches in a third dimension.

21. The handheld mobile device of claim **15**, further comprising a microelectromechanical system (MEMS) configured to detect movement and/or orientation of the handheld mobile device.

22. The handheld mobile device of claim **21**, further comprising a display, wherein an orientation of an image rendered on the display is modified based on a signal received from the MEMS.

23. The handheld mobile device of claim **21**, further comprising a removably attached tray capable of housing zero or more pieces of paper.

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